PATENT CLAIMS

~~(Demand filed on 24th Octobre 2000)~~

1. Method for the production of moulded bodies on the basis of a polyurethane material where

a) a preferably flowable mixture of starting components is prepared which contains, on one hand isocyanate and on the other hand monomers with reactive double bonds and containing hydroxyl groups, preferably acrylate or methacrylate containing hydroxyl groups, where the monomers containing hydroxyl groups are used in a stoichiometric ratio or in less than the stoichiometric amount relative to isocyanate; and

b) the mixture is subjected to a nonradical-triggered polyaddition reaction generating a radical-polymerisable preform having a contant of nonextractable, reactive double bonds - that can be determined by DSC - of at least 0.5 mmole/g and is free of extractable monomers with reactive double bonds;

characterised in that the mixture before or during the polyaddition reaction is brought to a desired form by methods of plastics engineering known per se, in particular by casting, pressing, rolling or extruding, and the resulting flexible, where applicable elastic preform is definitely cured to a structurally rigid moulded body at any time, preferably after a further forming, particularly without the removal of material, by radical-triggered polymerisation of the reactive double bonds.

2. Method according to claim 1, characterised in that the mixture of starting components contains isocyanate and (meth)acrylate containing hydroxyl groups in a ratio of about 1 : 1 between the OH and NCO groups, and that at least one of the starting components is at least bifunctional, preferably tri or polyfunctional.

3. Method according to one of the claims 1 or 2, characterised in that the curing by radical-triggered polymerisation occurs essentially without emissions.

4. Method according to one of the claims 1 to 3, characterised in that the preform is produced in the shape of a film, tape, ribbon or any mould, and subsequently sub-

jected to at least one further forming, preferably without the removal of material, for instance by bending, twisting, pressing, rolling, or deep-drawing.

5. Method according to one of the claims 1 to 4, characterised in that to the starting components at least one of the following components is added: a filler, a fibre material, a coloured pigment.

6. Method according to one of the claims 1 to 5, characterised in that a definite curing of the preform occurs by radical polymerisation of the free double bonds while applying elevated pressure and/or elevated temperature and/or irradiation with microwaves or energy-rich radiation, particularly ionising radiation.

7. Method according to one of the claims 1 to 6, characterised in that to the mixture of starting components at least one catalyst adapted to trigger and/or accelerate a radical-type polymerisation of the reactive double bonds is added, particularly a hot-curing or photocatalyst, in an amount of up to 5 % by weight, preferably 0.1 to 1 % by weight.

8. Method according to one of the claims 1 to 7, characterised in that two or more preforms, particularly in the form of films, tapes, ribbons, or plates, which are brought in mutual contact, preferably piled up as layers or glued together with the aid of an adhesion promoter, are bonded together while applying elevated pressure and elevated temperature to yield composites or laminates of any desired layer thickness, and definitely cured, where appropriate with the aid of light.

9. Method according to claim 8, characterised in that fibre material, particularly in the form of woven or nonwoven fibre fabric, is inserted between the preforms prior to definite curing by radical polymerisation.

10. Method according to one of the claims 5 to 9, characterised in that to the starting components a filler is added in a concentration of at most 80 % by weight, preferably of 20 to 75 and particularly of about 40 to 70 % by weight.

11. Method according to one of the claims 5 to 8, characterised in that the fibre material is present in the form of unidirectional fibre strands, woven or nonwoven fibre fabric and preferably contains glass fibres, carbon fibres, aramide fibres, polyethylene fibres, cellulose fibres, and/or other suitable plastic fibres.

12. Method according to claim 11, characterised in that the fibre material prior to the polyaddition reaction is impregnated with a mixture of the starting components, and then moulded in the form of plates or film and subjected to the polyaddition reaction.

13. Method according to claim 6, characterised in that the curing of the preform occurs at a pressure of 2 to 10 bar and/or a temperature of 80 to 150 °C and/or under irradition with light having a wavelength of 300 to 500 nm or with microwaves having a wavelength of 1 to 1000 mm.

14. Moulded body on the basis of a preform produced by a nonradical-triggered polyaddition reaction, with a polyurethane matrix from isocyanate and monomers with reactive double bonds containing hydroxyl groups, particularly (meth)acrylate containing hydroxyl groups and, where appropriate, from further additives, where the monomers containing hydroxyl groups are present in a stoichiometric or substoichiometric ratio relative to the isocyanate and the preform has a content of nonextractable, reactive double bonds - that can be determined by DSC - of at least 0.5 mmole/g and is free of extractable monomers with reactive double bonds, characterised in that the preform is present in the form of a structurally rigid object or formed part definitely cured by radical polymerisation of the reactive double bonds.

15. Moulded body according to claim 14, characterised in that prior to the polyaddition reaction, isocyanate and (meth)acrylate containing hydroxyl groups are present as the starting components in a ratio of about 1 : 1 of the OH and NCO groups, and that at least one of the starting compounds is at least bifunctional, preferably tri or polyfunctional.

16. Moulded body according to one of the claims 14 to 15, characterised in that it is colourless and translucent, more particularly crystal clear.

17. Moulded body according to one of the claims 14 to 16, characterised in that it contains at least one of the following additives: filler, fibre material, coloured pigment, and/or exhibits a surface treatment, particularly a coating, coloration, painting and/or texture.

18. Moulded body according to one of the claims 14 to 17, characterised in that it is present as a cured composite or laminate formed from at least two curable preforms.

19. Polyurethane-based moulded body that can be obtained by a method according to one of the claims 1 to 13.

20. Use of a flexible, where appropriate elastic preform with a polyurethane matrix produced by a nonradical-triggered polyaddition reaction from isocyanate and monomers with reactive double bonds containing hydroxyl groups, particularly (meth)acrylate containing hydroxyl groups, and where appropriate further additives, which has a content of nonextractable, reactive double bonds - that can be determined by DSC - of at least 0.5 mmole/g and is free of extractable monomers with reactive double bonds, for the production of a structurally rigid object or formed part by definite curing of the preform via radical polymerisation, preferably free of emissions, after or during a further mechanical forming of the preform, particularly without the removal of material.

21. Use according to claim 20, where the further processing and simultaneous or subsequent definite curing of the preform occur directly at the point of use.

22. Use according to claim 20 or 21 for the production of technical formed parts, design and support elements, optical wave guides, tool components, covers and

protective films, electrical, thermal or acoustic insulating elements, toys, utensils, art objects, or decorative objects.

23. Use of a moulded body according to one of the claims 14 to 19 for the production of technical formed parts, design and support elements, optical wave guides, tool components, covers and protective films, electrical, thermal or acoustic insulating elements, toys, utensils, art objects, or decorative objects.

24. Use according to one of the claims 20 to 23, for applications in medicine, dentistry, civil and mechanical engineering, fastening technology, insulating and packaging technology, the automotive industry, measuring technology, households, as well as in fine art.